Report on Potentials for Improvement of Slovene University Education in Geodesy and Specifically in LIS/GIS

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Introduction

1. This report is prepared with reference to the proposal for a two months teaching assignment at the Department of Geodesy, Faculty of Civil and Geodetic Engineering, University of Ljubljana (Contract TEMPUS IMG-94-DK-1005). According to the proposal the output of the assignment will consist of "A short report (which) will list the teaching material prepared, present recommendations for further actions to improve the study programme and its relations to the society, and (which) may identify obstacles to overcome".

2. During the teaching assignment - from 7. April to 6. June 1995 - a draft version of the present report was prepared. The draft was presented and discussed the 25. May at a meeting which was convened by Head of Geodetic Department, docent Dr. Dusan Kogoj, cf. annex 1. The discussions at the meeting provided suggestions and views that are reflected in the report, but still I bear the responsibility for facts, omissions, opinions, etc. expressed in this report.

3. The basic and recurring issue which was raised at interviews and discussions (cf. annex 2) during the visit was the relation between the university education and the needs of the society. Persons from governmental bodies, and from public and private companies were asked to express their opinion on the issue.

More specifically, they were asked to comment on their perception of the knowledge profile which was provided by university teaching, compared to the knowledge profile which was considered relevant for their present job. For managers the question regarded the knowledge profile of employees with a diploma in geodesy (Dipl.Ing.Geodet).

The priority given to this issue had as a consequence that the time available for improving teaching materials was reduced. Moreover, the interest in the present Danish situation was outspoken. As a consequence of this, a series of lectures were organised jointly by the university and the Ljubljana Geodetic Association, cf. annex 3. Two sets of overhead foils were presented simultaneously in the English and the Slovene language to overcome the language barrier of some of the about 20 attendants. The lecture material is available at the Geodetic Department.

The main issue: The match of knowledge profiles

4. The issue of relations between university and society was motivated by Danish experiences, cf. section 5 below, but quickly it became apparent that the Geodetic Department was concerned with the same issue: Late in 1994 a proposal for a revised curriculum for geodesists was circulated in about 20 copies to governmental agencies, and to public and

private companies of the profession. Some responses were received, and through discussion with the respondents their views were largely taken into account. However, the reaction from the professional society was felt to be too scarce. It thus appeared that the Department and I shared a common concern for the improvement of communication on the Geodetic education between the university - here the Geodetic Department - and the professional society.

5. The issue of relations between university teaching and the corresponding professional society has been described by the present author in (Stubkjær, 1993) at the Second Seminar: Education in Land Information Systems, 7.-9. June 1993, London, an activity of the EC TEMPUS Joint European Project: Education in Land Information Systems (JEP 2828).

The paper mentions the following instruments for monitoring the quality of the education:

- formal enquiries into the job content of land surveyors at large,
- problem oriented student project work,
- a study board with weight relative to teacher groups ('Kathedra'), and with student representation, and
- assessment by students of courses.

Furthermore, the use of external examiners from related universities, or from mapping or planning companies, is part of the Danish practice.

A terminological remark: In Denmark (as well as in most other Nordic countries) a 'land surveyor' corresponds to what in Slovenia (and other Central European countries) is termed a 'geodesist'. The curriculum generally includes geodesy (in the narrow sense; sometimes called 'higher geodesy'), land surveying, cartography, remote sensing, geographical and land information systems, cadastral and land law, land management, etc. Depending on the circumstances the department may be called Department of Geodesy, Department of Cartography, Department of Geodetic Engineering, etc. However, the content of the curriculum has many common traits, cf. an investigation by Dr Allen (Allen, 1989) mentioned in section 8. Furthermore, the different national organisation of the candidates are united in the International Federation of Surveyors (FIG). In the following 'geodesy' refer to the broad sense of the term, corresponding to the whole curriculum.

6. The present report emphasizes the relations between university teaching and society. Other relations, e.g research relations with other universities, are important for teaching as well, but these relations are not discussed here.

Education and cultural values

7. The above mentioned Danish experiences motivated the informal enquiry which was conducted during the visit. However, caution was taken not to transfer Danish experiences directly. It was taken into account, that Denmark and Slovenia belong to regions with different cultural values and attitudes, as appears from the following.

Derek Mainwarning and Krys Markowski have investigated cultural factors related to European engineering studies. Based on interviews of staff and students with work and/or study experience abroad they present an overview of educational systems in Europe. Their initial research suggest three groups of countries: 1) the UK, Scandinavia, and the Netherlands, 2) Germany and Finland, and 3) France, Italy, Spain, Portugal and Greece (Mainwarning &

Markowski, 1991). The main focus of the research was cultural differences regarding teacher-student relationship, and the attitude towards uncertainty, e.g. in the context of teachers assessing student work.

Walter M Welsch describes the geodetic education internationally, and distinguishes between three different models of surveying/geodesy education in Europe (Welsch, 1991). Remarkably, the two independent investigations match concerning the mentioned three groups of countries.

In sum, Denmark belongs to the Scandinavian/UK model, while Slovenia belong to the Central European (German) model. This appears, among others, from the fact that the mentioned revision of the Slovene geodetic education was prepared by making comparisons with Central European geodetic educations only.

8. The curriculum of the geodetic education relates mainly to the disciplines of the faculties of (natural) science. The curriculum includes, however, also substantial parts of the social sciences, according to a study of Dr. A. L. Allen: 'The education and practice of the surveyor in the private sector within the European Economic Community'. The study was presented in 1980, and later updated (Allen, 1989). Dr. Allen's report details the contents of the education by an array of 20 disciplines, and the scope of the profession of the surveyor by 25 fields of work. It appears that law (cadastral law, laws on agriculture and environment, etc.), and, to a slightly lesser degree, planning are important items in the curricula of the two first mentioned models, i.e. in Northern and Central Europe.

The legal and planning part of the education establishes a relation between the university education and the public administration. As a consequence of this norms and values regarding public administration must be taken into account as well when the education in the geodetic field is discussed.

9. It has been a surprise to learn how centralized the decision structure is in Slovenia compared to Denmark or Germany. In Slovenia the coordination of activities which addresses two or more ministries seem to take place generally at the level of government or permanent secretary. In Denmark and Germany the use of joint commissions and working groups at lower levels is commonplace, and the outcome of the discussions and bargaining in these structures are generally binding for those who established the commissions, etc.

Furthermore, in Denmark the establishing of an association is informal, and most people at all levels would know how to run an association. In Slovenia the tradition seems to be that associations of any importance have to be 'wanted from above', and, consequently, a 'bottom-up' mobilization of opinions and skills is so far rare.

10. The described differences in norms and values between Denmark and Slovenia mean that the content of the present proposal may be inappropriate according to Slovene values. The issue of values has been raised here to make it more easy to include these values into the further discussion of the geodetic education.

Suggestions for improvements

A. Improving interaction between university and employers of candidates

11. Interaction between university teaching, employers of candidates, and professional circles at large, is considered important because of the following reasons:

- students with completed education (candidates) will have improved job opportunities
- needs for research become more available and are stated in a more varied way. Support for research funding can be obtained from the employer companies.
- omissions in education is more easily detected
- image of profession among general public is likely to grow.

12. It is suggested:
- that the Head of Department of the Geodetic Department visits relevant agencies and companies on their premises to discuss the latter's needs regarding research and development (e.g. with a view to diploma work). In this context, the university education may be discussed as well.
- that the Geodetic Department issues a formal statement (e.g. in the professional journal) which refer to past experiences concerning interaction between university and professional circles, call for concern of the situation, and states the Departments commitment to improve the situation
- that the present report is published in the Slovene professional journal in a suitably edited form.

As a supplementary activity the Department may consider to invite one or two professional person(s), e.g. a retired head of a larger cadastral office, to investigate the interactions between university and society in an informal way, and to express the findings through meetings and contributions to professional newsletters, etc.

B. Foreign language teaching

13. Ability in using foreign language is evidently important and staff as well as students raised the issue of introducing formal teaching in English into the curriculum.

It is not the task of a Geodetic Department to improve the students' basic skills in foreign languages, but to introduce the students to professional literature and to recent research, especially in English. Therefore, if formal teaching in foreign language is offered it should only be given to 2nd or 3rd year students.

14. An assignment was recently given to students who were asked to translate an introductory, professional text (on geographical information systems) from English into Slovene. The assignment was answered by the students in a satisfactory way in terms of return rate and quality of translation.

One interpretation of this outcome is that students in general have an insufficient knowledge of the (modest) language skills which are required by the courses. Another interpretation is that students demanded more foreign language teaching material than the teachers were prepared to use.

5. It is proposed
- that measures are taken to inform the students of the level of language skills which the mentioned teaching presupposes, and to provide guidance on how to achieve that level.
- that the Department increases the number of Bi- or Tri-lingual correspondents relative to the number of general clerks. The correspondents could assist the students as mentioned above, and assist the teachers in better application of teaching material in

foreign language.

- that a network between such correspondents at European Departments of Geodesy (or Cartography, .. etc) is established and supported with a view to overcome the language barrier through concerted efforts.

C. Teaching methods: Project work, etc.

16. Project work is a form of university teaching which has gained increased interest during the 1980s. This kind of teaching benefits from certain facilities, e.g. rooms at the university for student groups. However, project work may be introduced gradually, e.g. from 3rd study year, and only for a period of about 1 month's length. Under these circumstances access to facilities, like rooms and computers may be manageable.

Teaching in the form of project work was in fact offered at the institution as an alternative to traditional courses, but it was ruled out during 1994. The details of this decision was not pursued, but a general comment was that the faculty felt that project work did not provide students with adequate knowledge as the alternative courses with examinations would do.

A distinction may be made between students' verifiable knowledge and their gained knowledge: The more diverse nature of project work makes it more difficult to assess the gained knowledge. The level of students' verifiable knowledge may thus tend to decrease when teaching in the form of project work is applied. The uncertainty whether the students in fact gained a sufficient level of knowledge is more or less acceptable, depending on the cultural values which were mentioned in the previous part of the report. The study by Mainwarning & Markowski indicates that the more south you go in Europe the more uncertainty is avoided.

17. It is proposed

- that a project work is specified and implemented, e.g. concerning the preparation of a small publication (leaflet) intended for tourists. The use of maps and other geoinformation is crucial, and the production shall be computer based as appropriate.
- that students support one another in the learning process, e.g. by reciprocal review of reports, etc. before the reports are submitted to the teacher.
- that students report in writing from study tours to other countries, and submit abstract of the report to the professional journal.

Implementation of the suggestions

18. The suggestions mostly addresses the Geodetic Department, but depends, in part, on decisions by the editors of the professional journal, and by students, individually or in groups.

Indications on the part of the editors makes it likely that the present report will be published in a suitably edited form. This leaves the Department with the opportunity of taking at least some of the suggested steps before or after the publishing of the report. So far the professional circles have been reluctant to 'interfere into university business', but the changes in society at large, and the general availability of the professional journal makes the situation

more undetermined.

Some steps, e.g. the employment of correspondents, can be implemented by the Department only when positions become vacant, although the fundamental decision can be made rather soon.

19. Setting up a network between correspondents and language teachers who are related to European Geodetic Departments is likely to depend on financial support (from the EU ?). Funding may be relevant for costs regarding the organization of the network activities, for mutual short visits, and for the provision of suitable methods and tools for storing and communication of technical terms, etc. Assessing the cost/benefit ratio of this suggestion is outside the scope of the present report.

Conclusion

20. The colleagues at the Geodetic Department of the University of Ljubljana have already - through their generous and open-minded attitude towards me during the visit - contributed substantially to fulfil the purpose of my visit: The improvement of Slovene university education in geodesy, and specifically in LIS/GIS.

The discussions during the visit and the present report may contribute to this improvement by indicating some steps which seem to be beneficial in terms of improving the relations between the university and the employers of future geodesists. The support by the TEMPUS Individual Mobility Grant thus seems justified.

Finally, the grant has provided me with two months which have been of outstanding value to me, professionally as privately. The support by the PHARE/TEMPUS grant is gratefully acknowledged.

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University of Ljubljana, Faculty of Civil and Geodetic Engineering

Ljubljana Geodetic Association

LIS/GIS in Denmark with the Emphasis on Administrative Aspects

The general context of the lectures is a TEMPUS grant program aiming at the improvement of the geodetic/land surveying education. This includes the strengthening of the relations between the education and activities in the society, e.g. the market in land and buildings, construction activities, environmental issues like biodiversity, administrative cooperation and efficiency, e.g. in the mapping and utility sector.

Purpose: The lectures aim at informing the Slovene land surveying audience on Danish practices related to the registration and mapping of land, especially properties. The tasks of the surveying profession are emphasized.

Presentation: The lectures are presented in English. Questions are welcomed and may be raised and answered in English or German. Every of the four parts is presented through a double lecture (2 * 45 minutes) with a short break (15 minutes). Additional time can be provided for raised questions and discussion.

Location: Faculty of Civil and Geodetic Engineering (FGG), Jamova 2, Ljubljana, in the Presentation Hall at the II. floor.

Preconditions: A working knowledge of English, including technical terms of the field. Familiarity with mapping and administrative procedures.

Timetable and Headlines

1. *Thursday 11. 05. 1995 at 12^h* : **Opening Address by mag. Dušan Blagajne, State Secretary at the Ministry of Environment and Physical Planning,**

   Thursday 11. 05. 1995 at 12^{30} : **Introduction. The Danish Administrative Structure. Property Registration and Updating Procedures.**

2. *Wednesday 17. 05. 1995 at 13^h* : **Planning and Reinforcement of Plans by Means of Cadastral Procedures.**

3. *Thursday 25. 05. 1995 at 13^h* : **GIS Development in Denmark.**

4. *Thursday 01. 06. 1995 at 13^h* : **The Role of the Land Surveying Profession in Denmark and Other Countries (especially regarding education).**

1. Introduction. The Danish Administrative Structure. Property Registration and Updating Procedures.

Purpose: Provide context for further lectures. Inform on the purpose, content and structure of the public property registers, and on the updating procedures.

Content: Introduction.- Terminology: LIS, GIS, geo-data and cadastre.- The ministries, their tasks and their registers. Local government. The property identifiers.- Updating procedures: Conveyancing. Subdivision. Building permits.

2. Planning and Reinforcement of Plans by Means of Cadastral Procedures.

Purpose: Give examples of Danish regulations of land use. Demonstrate the role of cadastral procedures regarding law enforcement.

Content: Environmental and urban planning. Legal instruments for conservation, and regarding biodiversity. Cadastral procedures and planning/environmental law. - Regulation of the ownership, size, etc. of farms. Land consolidation, and restoration of biotopes. -What enforces subscription to the law.

3. GIS Development in Denmark

Purpose: Describe GIS applications with a view to purpose and outcome.

Content: The application of new technology for mapping, etc. GIS in municipalities (urban local government) of different size. GIS at regional level. Utility companies and GIS. The actors on the scene.

4. The Role of the Land Surveying Profession in Denmark and Other Countries (especially regarding education)

Purpose: Selected activities of the Danish Association of Chartered Surveyors are outlined in order to stimulate a discussion of the potential role of the land surveying profession at large.

Content: The profession and the professional association. Tasks of a professional union, e.g. the setting of professional norms. The role of the university faculty, e.g. providing industry with new knowledge. The land surveying education. Danish practices in order to keep the education up to date.

Prof., Lic.Agro. Erik Stubkjaer is a Professor (Cadastral Science) at the Aalborg University, Department of Development and Planning since 1977. The university is the only Danish venue of education for land surveyors. He was closely involved with the revision of the land surveying education which, from 1986, includes a compulsory term devoted to land information systems.

He lectures on land information systems and on selected issues of land law and cadastral law. His research interests include methodology, computer-aided education and cadastral development. In 1986 he was a co-author on a methodology textbook for freshmen. 1987-91 he was the manager of a multi-disciplinary project on computer-assisted education for land information systems which was funded by the Danish Ministry of Industry and Commerce.

Stubkjær represents one of the partners of a Joint European Project on Education in Land Information Systems (ELIS) which started 1991. In 1992 and 1993 Stubkjær lectured on organizational aspects of land information systems at an intensive one-week part of an advanced 6 month post graduate course at the Faculty of Geodetic Engineering, Delft University of Technology, the Netherlands. Professor Stubkjær is here in Ljubljana at the Faculty of Civil and Geodetic Engineering as a guest professor for the period of two months.

Selected Research Contributions:

1990 The Implementation of Policies related to Agriculture and Environment - an essay. *Traveaux scientifiques de la Faculté Européene des Sciences du Foncier* Vol 14 (1992) 271-286. Frankfurt/Main, ISSN 0721-5061.

1991 The development of national, multi-purpose spatial information systems - Danish experiences in a theoretical context *Computers, Environment and Urban Systems* Vol 16, no 3 (May/June 1992) p 209-217.

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1993 Roads to cities, to geographic information systems, and to knowledge, P M Nobar & W Kainz (Eds) Proceedings, International Conference of Computer Based Learning in Science, Vienna, December 1993. London, 1993. ISBN 80-7040-082-X. p 521-529.

1994 Employing the Linguistic Paradigm for Spatial Information. Proceedings, 6th International Symposium on Spatial Data Handling, Edinburgh, September 1994. Edinburgh, 1994, Vol 1, p 572-587,.

1994 A Theoretical Basis for Cadastral Development. Proceedings, Third Seminar of the European Co-operation Network for Education and Research in Land Information Systems (EUROLIS) September 1994, Delft, (in press)

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